

## Marblehead Municipal Light Department

### *Integrated AMI System with Real-Time Pricing Pilot Program*

#### Abstract

The Marblehead Municipal Light Department (MMLD) project involves the town-wide installation of a fully integrated advanced metering system and a pilot program to assess the effectiveness of time-based rate programs and automated load management. It is aimed at reducing peak electricity demand, overall energy use, and operations and maintenance costs while increasing distribution system efficiency, reliability, and power quality. The project implements two-way communication to: (1) allow customers to view their energy consumption at their convenience through an energy Web portal, and (2) allow MMLD to manage, measure, and verify targeted demand reductions during peak periods. The project also includes a study of consumer behavior in response to a critical peak pricing service option.

#### Smart Grid Features

**Communications infrastructure** includes an advanced network system that will provide the backbone for current energy management programs and allow for future integration with distribution automation, smart appliances, and home area networks. This infrastructure provides MMLD with expanded capabilities for adding future programs and functionality to optimize energy delivery, system reliability, and customer participation.

**Advanced metering infrastructure (AMI)** includes a system-wide rollout to all 10,891 MMLD residential, commercial, and municipal customers. These advanced meters provide the capability for a variety of current and future customer electricity price and service options and will reduce MMLD's costs of electricity delivery. Operational cost savings come from lower meter reading and customer services costs. New AMI features such as outage and restoration notification and a remote service switch will enable MMLD to respond to outages and customer requests more efficiently.

**Direct load control programs** will be offered to a group of residential customers who volunteer to receive programmable communicating thermostats or water heater and swimming pool pump control devices—and to a group of commercial and municipal customers who volunteer to install energy management systems on certain continuously running equipment. MMLD can either cycle the customer's heating and cooling load, or change the thermostat setting during peak periods.

#### At-A-Glance

**Recipient:** Marblehead Municipal Light Department

**State:** Massachusetts

**NERC Region:** Northeast Power Coordinating Council

**Total Budget:** \$2,692,350

**Federal Share:** \$1,346,175

**Project Type:** Advanced Metering Infrastructure and Customer Systems

#### Equipment

- More than 10,000 Smart Meters
- Advanced Metering Infrastructure Communication Systems
  - Meter Communications Network
  - Backhaul Communications
- More than 10,000 Customer Web Portal Access
- Up to 150 In-Home Displays
- Up to 150 Programmable Communicating Thermostats
- Up to 300 Direct Load Control Devices (Pool Pumps and Water Heaters)
- Energy Management Systems

#### Time-Based Rate Program

- Critical Peak Pricing

#### Key Targeted Benefits

- Reduced Electricity Costs for Customers
- Reduced Operating and Maintenance Costs
- Increased Electric Service Reliability and Power Quality
- Reduced Greenhouse Gas Emissions
- Reduced Costs from Equipment Failures, Distribution Line Losses, and Theft

**Marblehead Municipal Light District** (continued)

**Advanced electricity service options**, offered in conjunction with the direct load control programs, enable the customers to monitor and control their own electricity use. Programmable communicating thermostats offer appliance control to allow customers to better manage their central air conditioning units and possibly other thermostat-using heating, cooling, or refrigeration devices. Thermostat setting changes requested by MMLD will be accompanied by local notification at the thermostat unit, providing customers with the ability to override the changed setting. A Web portal, available to all customers with new smart meters, provides home appliance control functionality by allowing them to control home devices (e.g., lighting and thermostats) that are compatible with the system. In addition, MMLD will provide in-home and in-business displays to customers who volunteer to receive information feedback on their electricity usage. Similar feedback will also be available through a Web portal, which provides a real-time energy feed that will display changes in energy in 10-second increments. Marketing and education materials include bill inserts, a Web site, direct mail, press releases, and other community outreach initiatives.

**Time-based rate programs** includes the use of a new critical peak pricing (CPP) program and related information services in conjunction with advanced metering to encourage consumers to shift their consumption from on- to off-peak periods and then to measure and validate their demand response. CPP is being offered as part of a consumer behavior study; other pricing options will be evaluated by MMLD along with new possible load control programs.

**Consumer Behavior Study**

MMLD is rolling out a pricing option to—as well as collecting interval load data from—a subset of consumers using the advanced meters. The goal is to assess how residential consumers accept and respond to CPP on a voluntary (“opt-in”) basis to reduce peak demand during the summer months. The study consists of a single treatment group of residential customers on a CPP rate and the ability for MMLD to declare up to 12 CPP days during June, July, and August. CPP days will be announced one day in advance, with notification to customers that the cost of electricity during a subset of hours the following day will be higher. Throughout the entirety of the study, participating customers will be provided with access to a Web portal providing detailed information on their electricity consumption. Notification and enabling technologies such as in-home displays and programmable communicating thermostats will be installed and assessed in the study’s second year.

**Timeline**

Key Milestones	Target Dates
AMI/Customer system asset deployment begins	Q1 2011
AMI/Customer system asset deployment completed	Q4 2012

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